We claim:

1. A method comprising:

modulating the output of an optical source to optically encode electronic data using phase shift keying (PSK) to generate an optical signal; and

alternating the polarization of the phase shift keyed optical signal using a modulator such that successive optical bits have substantially orthogonal polarizations to generate an alternate polarization PSK (APol-PSK) signal.

2. The method of claim 1 wherein the modulator is a phase modulator driven by a sinusoidal RF voltage.

3. The method of claim 1 wherein the modulator is a phase modulator driven by a train of square pulses.

4. The method of claim 1 wherein the optical signal is launched into the modulator having a polarization oriented at a predetermined angle such that the polarization of successive optical bits of the output signal are substantially orthogonal.

5. The method of claim 1 wherein the modulator is a Mach-Zehnder modulator including a polarization rotation device in at least one arm.

6. The method of claim 5 wherein the polarization rotation device is a half-wave plate.

7. The method of claim 5 wherein at least one arm of the modulator is driven by a sinusoidal RF voltage.

8. The method of claim 5 wherein at least one arm of the modulator is driven by a train of square pulses running at half the bit rate.

9. A method of APol-PSK transmission comprising:

using an electronic data signal to drive a Mach-Zehnder modulator having a polarization rotation device in at least one arm to provide simultaneous polarization alternation and optical data encoding by phase shift keying to generate an APol-PSK signal.

10. A method comprising:

precoding an electronic data signal;

modulating the output of an optical source using the precoded electronic data signal and differential phase shift keying between two optical bits separated by an even number of bit periods to generate an encoded optical signal; and

alternating the polarization of the encoded optical signal using a modulator such that successive optical bits have substantially orthogonal polarizations to generate an APol-DPSK signal.

11. The method of claim 10 further comprising demodulating the APol-DPSK signal using an even bit delay line interferometer.

12. A method of APol-DPSK transmission comprising:

precoding an electronic data signal;

using the precoded electronic data signal to drive a Mach-Zehnder modulator including a polarization rotation device in at least one arm to provide simultaneous polarization alternation and optical data encoding by phase shift keying between two optical bits separated by an even number of bit periods to generate an APol-DPSK signal.

13. The method of claim 12 wherein the polarization rotation device is a half-wave plate.

14. The method of claim 12 further comprising demodulating the APol-DPSK signal using an even bit delay line interferometer.

15. An optical transmitter for APol-PSK transmission comprising:

an optical source,

an optical phase-shift-keying data modulator optically coupled to the optical source; and

a polarization alternator optically coupled to the data modulator to provide polarization alternation of the output of the data modulator.

16. The apparatus of claim 15 wherein the polarization alternator is a phase modulator driven by a sinusoidal RF voltage.

17. The apparatus of claim 15 wherein the polarization alternator is a phase modulator driven by a train of square pulses running at half the bit rate.

18. The apparatus of claim 15 wherein the polarization alternator is a modified Mach-Zehnder modulator having a polarization rotation device in one arm.

19. The apparatus of claim 18 wherein at least one arm of the modulator is driven by a sinusoidal RF voltage.

20. The apparatus of claim 18 wherein at least one arm of the modulator is driven by a train of square pulses running at half the bit rate.

21. The apparatus of claim 15 wherein the polarization alternator is a Mach-Zehnder modulator having two complementary output ports, and wherein the apparatus further comprises a polarization beam combiner for combining outputs from the two output ports of the Mach-Zehnder modulator.

22. The apparatus of claim 21 wherein at least one arm of the modulator is driven by a sinusoidal RF voltage.

23. The apparatus of claim 21 wherein at least one arm of the modulator is driven by a train of square pulses running at half the bit rate.

24. An optical transmitter for APol-DPSK transmission comprising:

an optical source,

a precoder device for precoding an electronic data signal;

an optical phase-shift-keying data modulator optically coupled to the laser source and driven by a precoded electronic data signal from the precoder device to produce an optical DPSK signal wherein electronic data to be transmitted is optically encoded by the data modulator as phase shift keying between two optical bits separated by an even number of bit periods; and

a polarization alternator optically coupled to the data modulator to provide polarization alternation of the output of the data modulator.

25. An optical transmitter for APol-PSK transmission comprising:

an optical source;

a Mach-Zehnder (MZ) modulator device optically coupled to the laser source having a polarization rotation device in one arm; and

drive circuitry coupled to the MZ modulator device to drive a MZ modulator to simultaneously provide polarization alternation and optical data encoding of an optical signal using phase shift keying.

26. An optical transmitter for APol-DPSK transmission comprising:

an optical source;

a precoder;

a Mach-Zehnder (MZ) modulator device optically coupled to the laser source having a half-wave plate in one arm; and

drive circuitry coupled to the MZ modulator device to drive a MZ modulator using a precoded data signal from the precoder to simultaneously provide polarization alternation and optical data encoding of an optical signal using phase shift keying.

27. An optical transmission system for transmitting APol-PSK signals comprising:

an optical source,

an optical phase-shift-keying data modulator optically coupled to the optical source; and

a polarization alternator optically coupled to the data modulator to provide polarization alternation of the output of the data modulator.

28. An optical transmission system for APol-PSK transmission comprising:

an optical source,

a modulator means having a polarization rotation device to provide polarization alternation and optical data encoding by phase shift keying to generate an APol-PSK signal.

29. An optical transmission system for APol-DPSK transmission comprising:

an optical source;

a precoder device for precoding an electronic data signal;

an optical phase-shift-keying data modulator optically coupled to the laser source and driven by a precoded electronic data signal from the precoder device to produce an optical DPSK signal wherein electronic data to be transmitted is optically encoded by the data modulator as phase shift keying between two optical bits separated by an even number of bit periods; and

a polarization alternator optically coupled to the data modulator to provide polarization alternation of the output of the data modulator.

30. An apparatus for generating an APol-PSK optical signal comprising:

means for encoding electronic data using phase shift keying (PSK) to generate an optical signal; and

modulator means for alternating the polarization of the optical signal to generate an alternate polarization PSK (APol-PSK) signal.